



# Southern Forest Health Research and Management Update



Fall 2018

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joint publication of:**

**USDA Forest Service  
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and Invasive Plants of  
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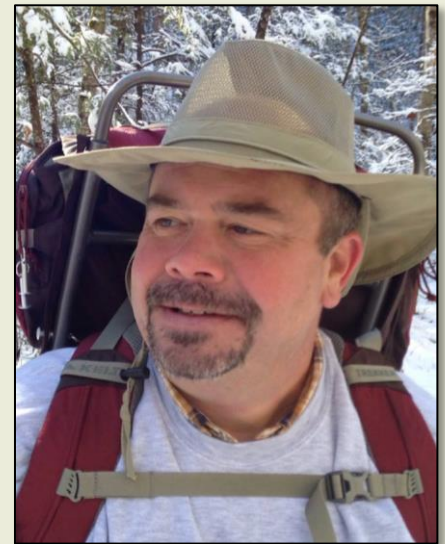
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## Science and Program Highlights

### **SRS 4552 Insect, Diseases and Invasive Plants: An Update from the Project Leader, J.T. Vogt**

Greetings all! I want to take a moment to provide a recap for our Research Work Unit's Fiscal Year 2018, which ended on September 30, and some thoughts on our outlook for Fiscal Year 2019. Our Unit had a very productive year for 2018. Some highlights:

- Authored or co-authored 30 peer-reviewed publications
- Gave more than 50 presentations to scientific and other organizations
- Gave six tours to educational and professional organizations



We are also involved in helping train and mentor the next generation of scientists addressing forest health issues, supporting (in part) 7 graduate students in 2018. So much of what we do is in collaboration with our partners – Universities, State agencies, other Federal agencies, and our partners within the Forest Service. To all of the people with whom we collaborate – we appreciate you and enjoy the great relationships we have developed. Together we are continuing to make headway in diverse areas such as hemlock restoration, invasive plant control, forest health monitoring, pollinator biology, and insect-plant-pathogen interactions, among other things. We help lay the groundwork for action, management, and synthesis. I am proud of the work we do –all of it has tremendous value to our partners and stakeholders who are interested in advancing science and solving problems.

Fiscal Year 2019 will be a challenging one, with the Unit possibly facing some difficult decisions. It is no secret that we have been reduced to about half of the personnel we enjoyed some 10 years ago, with a current total of 20 employees. Ongoing challenges with our budget continue to push us to find creative ways to partner with others to maximize production and impact. It is also no secret that “meetings management” and reduced budgets are whittling away at our presence and participation at professional events, greatly impacting our ability to accept late invitations or commit early to attending and filling important roles in meetings. In the face of these challenges it is imperative that we identify areas where we can build teams to address problems and seek support. I look forward to speaking with many of you in the coming months to examine ways that we can work together and support one another, whether it's adding value to ongoing projects or opening new lines of research as new forest threats emerge. Please feel free to contact me at any time – [jtvogt@fs.fed.us](mailto:jtvogt@fs.fed.us), or (865) 978-0664.

## Coarse woody debris in the longleaf pine ecosystem

As part of a larger effort to establish baseline information on pollinator communities in the longleaf pine ecosystem, **Michael Ulyshen** and **Scott Horn** and their collaborators from Tall Timbers Research Station and UGA published an article in *Forest Ecology and Management* (<https://www.sciencedirect.com/science/article/pii/S0378112718309332>) comparing the amount and variety of coarse woody debris in old-growth and secondary longleaf pine forests. They found old-growth stands to support some of the lowest volumes of coarse woody debris ever reported from any old-growth forest, probably due to the low basal area of these forests and the high frequency of prescribed fire. Decay- and fire-resistant heartwood made up a large fraction of the dead wood pool and this material appears to be an indicator of old-growth conditions. Ongoing work will look at correlations between woody debris characteristics and pollinator communities, among other questions. For more information, please contact Michael Ulyshen ([mulyshen@fs.fed.us](mailto:mulyshen@fs.fed.us)).



Scott Horn and Joe McHugh (UGA) measure coarse woody debris in an old-growth longleaf pine stand. Photo by M. Ulyshen



Female *Agrilus macer* finishing an egg mass. Photo by M. Ulyshen.

## Role of *Agrilus macer* in sugarberry decline

Graduate student **Emilee Poole** (UGA entomology) and researchers from SRS 4552 (**Michael Ulyshen**, **Scott Horn**, **Steve Fraedrich** and **Rabiu Olatinwo**) and FHP-R8 (**Michelle Cram**) completed a study investigating whether *Agrilus macer* is a major contributing factor to high levels of sugarberry mortality in South Carolina and Georgia. Although rarely collected outside of Texas and Louisiana, *A. macer* appears to be widespread throughout the southern U.S. It is unusual among *Agrilus* species for laying large masses of eggs under a protective cap, and for attacking trees at incredible densities (up to 2 eggs/cm<sup>2</sup> of bark). Because this species is not consistently present on dying trees and does not appear to vector a harmful pathogen, however, it appears to be only a secondary pest on dying sugarberry trees. The manuscript has been submitted in revised form to *Annals of Forest Science*. For more information, contact Michael Ulyshen ([mulyshen@fs.fed.us](mailto:mulyshen@fs.fed.us)).

## Odor discrimination among sibling bark beetle species

A new paper by **Alicia Niño-Domínguez** (ECOSUR), **Brian T. Sullivan** (SRS 4552) and colleagues investigates the pheromones and host odors mediating simultaneous colonization of pines by two aggressive *Dendroctonus* bark beetle species in the Central American region: the southern pine beetle (*D. frontalis*) and the mesoamerican pine beetle (*D. mesoamericanus*). Although the two species share the same pheromone components, males of both species are able to discriminate odors associated with unpaired females of their own species. As part of this process, the sexes of each species produce differing combinations of these compounds and regulate pheromone production rates. This research will assist in devising strategies for using behavioral chemicals for disrupting host colonization by these species. The study is published in the journal *Environmental Entomology* <https://doi.org/10.1093/ee/nvy146>. For more information, please contact Brian Sullivan ([briansullivan@fs.fed.us](mailto:briansullivan@fs.fed.us)).



The mesoamerican pine beetle. Photo: B. Sullivan.



## Tracking the spread and impact of laurel wilt in sassafras

In 2018, scientists from SRS 4552 (**Bud Mayfield**, **Steve Fraedrich** and **Rabiu Olatinwo**) and FHP-R8 (**Jaesoon Hwang**) initiated a project to monitor the spread and impact of laurel wilt disease in sassafras beyond the southeastern Coastal Plain. Laurel wilt has already killed millions of redbay trees throughout the Coastal Plain, but the disease is now moving into the Piedmont and Mountain regions using sassafras as a host. With the help of **forestry agency cooperators** in eight states, 36 monitoring sites containing 681 geo-referenced sassafras trees were established in just 4 months. Laurel wilt was detected at 5 sites with sassafras mortality ranging from 0-67%, and the primary disease vector (redbay ambrosia beetle) was trapped at 2 sites. Laurel wilt was newly detected at the southern extreme of the Mountain region about 30 miles from Birmingham, AL, and is also in the Piedmont/Sandhills of SC less than 100 miles from the Blue Ridge. This continuing project is funded through the FHP Evaluation Monitoring Program. For more information, contact Bud Mayfield ([amayfield02@fs.fed.us](mailto:amayfield02@fs.fed.us)).



*A sassafras tree with laurel wilt in North Carolina. Photo: B. Mayfield.*

## In the News

### Dr. Jim Meeker to receive Regional Forester Honor Award for SPB program delivery

In November 2018, **Dr. James Meeker**, with Forest Health Protection, will be recognized with a Regional Forester Honor Award in the area of *Delivering State and Private Forestry Programs*. Since 2015, National Forests in Mississippi have experienced an unprecedented southern pine beetle (SPB) outbreak that impacted a multitude of high value resources, including adjacent private land, recreation areas, and red-cockaded woodpecker clusters. Jim's innovative approach to SPB management on an area-wide basis, and his commitment to customer service and satisfaction during the outbreak, have led to new, creative approaches to forest management that will accelerate the achievement of desired future forest conditions.

Jim was the point of contact and primary consultant in regard to suppression methods related to the beetle ecology and behavior. His expertise served to support the strategic goals and objectives of suppressing beetle activity, especially in understanding the necessity of an area-wide approach using the cut and remove method.



*FHP Entomologist Dr. Jim Meeker (left) delivering SPB management information to forest managers.*

Dr. Meeker's efforts will continue to ensure that the best science on SPB will be made available to the NFs in Mississippi and throughout the Region, along with state and private lands, and will serve to support this ongoing effort and those in the future. Congratulations, Jim, on this well-deserved recognition!

- Submitted by Brian Strom ([brianstrom@fs.fed.us](mailto:brianstrom@fs.fed.us)) and John Nowak ([jnowak@fs.fed.us](mailto:jnowak@fs.fed.us))

## Camcore USFS Partnership Update presented in Colombia

In October 2018, **Andy Whittier**, affiliate employee in SRS 4552 and research forester with NC State/Camcore's Domestic Conservation Program, travelled to the 38th Camcore Annual Meeting in Colombia to update a group of international foresters on some of the collaborative projects of Camcore and the US Forest Service. The meeting included scientists from the US, Central and South America, Africa, China, and Indonesia. Presentations highlighted different aspects of global forestry, and field tours demonstrated current research and forestry practices in Colombia. Andy's presentation focused on the Camcore and USFS work to conserve germplasm of threatened domestic tree species in the eastern US, as well as current research projects associated with these species. Andy also presented his recent master's research looking at nutrient deficiencies of teak seedlings. The opportunity to travel through the Colombian Andes and exchange research results with a diverse group of foresters was truly inspiring. Many thanks to Smurfit Kappa Colombia for hosting such an excellent meeting. For more information contact Andy Whittier ([wawhitti@ncsu.edu](mailto:wawhitti@ncsu.edu)).



*38<sup>th</sup> Camcore Annual Meeting attendees in a pine seed orchard near Restrepo, Colombia. Photo: J.J. Acosta, Camcore.*



*A canopy gap created to increase sunlight on an eastern hemlock "target tree" (arrow). Photo: J. Jones (USFS).*

## Field tour highlights hemlock silvicultural research

In August 2018, SRS 4552 scientists **Bud Mayfield** and **Bryan Mudder**, NCSU Camcore professor **Robert Jetton**, and FHP-R8 entomologist **Rusty Rhea** led a field demonstration during the 2018 Hemlock Woolly Adelgid (HWA) Program Manager's Meeting in McHenry, Maryland. The scientists gave participants a tour of silvicultural release treatments on the Savage River State Forest, where canopy gaps have been created to increase sunlight exposure on understory hemlock trees. The study is evaluating the effects of canopy gap type and size on HWA abundance, hemlock tree health, and competing vegetation. Thanks to a broad network of excellent cooperators on state lands and National Forests, the study includes 105 plots (21 replicates of 5 treatments) in 5 states. The work is funded through FHP's Special Technology Development Program (STDP). For more information contact Bud Mayfield ([amayfield02@fs.fed.us](mailto:amayfield02@fs.fed.us)).

## Thomas Whitney wins Roger F. Anderson Memorial Award

**Thomas D. Whitney**, Ph.D. Candidate at the Warnell School of Forestry & Natural Resources at the University of Georgia, was presented with the prestigious Roger F. Anderson Memorial Award at the 59th Southern Forest Insect Work Conference in July 2018. Co-advised by **Drs. Rima Lucardi** (SRS-4552) and **Kamal Gandhi** (UGA), Thomas was recognized for his "excellence in research and outstanding contributions to forest entomology by a graduate student." Thomas also placed first in graduate student oral presentations. Please join us (SRS-4552) in congratulating Thomas on this momentous accomplishment and well-deserved cash award!



*Dr. Scott Salom (left) presents Thomas Whitney (right) with the Roger F. Anderson Award.*



## Technology Transfer

### Publications (in print/press):

1. Benbow, ME; Barton, PS; Ulyshen, MD; Beasley, JC; DeVault, TL; Strickland, MS; Tomberlin, JK; Jordan, HR; Pechal, JL. In press. **The necrobiome: A unifying framework for understanding decomposer community structure and function.** Ecological Monographs.
2. Best, GS and SW Fraedrich. In press. **An assessment of the potential impact of laurel wilt on clonal populations of pondberry (*Lindera melissifolia*).** Southeastern Naturalist.
3. Bush BM; Ulyshen MD, Fair CG, Batzer, DW. In press. **Assessing the effects of mesh enclosure on invertebrates and litter breakdown in a floodplain forest of the southeastern USA.** Wetlands Ecology and Management.
4. Chase, K.D., L.D. Stringer, R.C. Butler, A.M. Liebhold, D.R. Miller, P.W. Shearer, and E.G. Bockerhoff. 2018. **Multiple-lure surveillance trapping for Ips bark beetles, *Monochamus* longhorn beetles, and *Halyomorpha halys* (Hemiptera: Pentatomidae).** J. Econ. Entomol. 111: 2255–2263.
5. Enloe, S.F., R.D. Lucardi, N.J. Loewenstein, D.K. Lauer. 2018. **Response of twelve Florida cogongrass (*Imperata cylindrica*) populations to herbicide treatment.** Invasive Plant Science & Management 11 (02):82-88. <https://doi.org/10.1017/inp.2018.12>
6. Fraedrich, SW, TC Harrington, Q Huang, SJ Zarnoch, JL Hanula, GS Best. In press. **Brood production by *Xyleborus glabratus* in bolts from trees infected and uninfected with the laurel wilt pathogen, *Raffaelea lauricola*.** Forest Science. <https://academic.oup.com/forestscience/advance-article/doi/10.1093/forsci/fxy018/5037818>.
7. Mayfield, A.E., III, C. Villari, J.L. Hamilton, J. Slye, W. Langston, K. Oten, and S.W. Fraedrich. In press. **First report of laurel wilt disease caused by *Raffaelea lauricola* on sassafras in North Carolina.** Plant Disease. <https://doi.org/10.1094/PDIS-05-18-0871-PDN>.
8. Miller, D.R., C.M. Crowe, M.D. Ginzel, C.M. Ranger, and P.B. Schultz. 2018. **Comparison of baited bottle and multiple-funnel traps for ambrosia beetles (Coleoptera: Curculionidae: Scolytinae) in eastern USA.** J. Entomol. Sci. 53: 347–360.
9. Niño-Domínguez, Alicia, Brian T. Sullivan, Jose H. Lopez-Urbina, Jorge E. Macías-Sámano. 2018. **Discrimination of odors associated with conspecific and heterospecific frass by sibling species *Dendroctonus frontalis* (Coleoptera: Curculionidae: Scolytinae) and *Dendroctonus mesoamericanus* (Coleoptera: Curculionidae: Scolytinae).** Environmental Entomology. <https://doi.org/10.1093/ee/nvy146>.
10. Rivers, JW; Galbraith, SM; Cane, JH; Shultz, CB; Ulyshen, MD; Kormann, UG. In press. **A review of research needs for pollinators in managed conifer forests.** Journal of Forestry.
11. Schelhas, J., T. Cabe, A. Walker, A. Mayfield, and B. Spatola. 2018. **Significant Trees of the Eastern Cherokee (youth education module).** Eastern Band of Cherokee Indians, Boys and Girls Club of American, and USDA Forest Service Southern Research Station (non-refereed).
12. Schulz, A.N., A.M. Mech, M.M. Cram, C. Asaro, D.R. Coyle, R.D. Lucardi, S. Lucas, and K.J.K. Gandhi. 2018. **Association of *Caliciopsis pinea* Peck and *Matsucoccus macrocitrices* Richards with eastern white pine (*Pinus***

**strobis L.) seedling dieback.** Forest Ecology & Management 423: 70-83.  
<https://doi.org/10.1016/j.foreco.2018.03.013>

13. Schulz, A.N., A.M. Mech, C. Asaro, D.R. Coyle, M.M. Cram, R.D. Lucardi, and K.J.K. Gandhi. 2018. **Assessment of abiotic and biotic factors associated with eastern white pine (*Pinus strobus* L.) dieback in the southern Appalachian Mountains.** Forest Ecology & Management 423: 59-69.  
<https://doi.org/10.1016/j.foreco.2018.02.021>
14. Sheehan TN; Ulyshen MD, Horn S, Hoebeke ER. In press. **Vertical stratification of bark and wood-boring beetles at the forest edge and forest interior: Is there an optimal trap location for detection?** Journal of Pest Science.
15. Shih HH, Wuest CE, Fraedrich SW, Harrington TC, Chen CY. 2018. **Assessing the susceptibility of Asian species of Lauraceae to the Laurel wilt pathogen *Raffaelea lauricola*.** Taiwan Journal of Forest Science 33(3):173-84.
16. Ulyshen, MD; Horn, S; Pokswinski, S; McHugh, JV; Hiers, JK. 2018. **A comparison of coarse woody debris volume and variety between old-growth and secondary longleaf pine forests in the southeastern United States.** Forest Ecology and Management 429: 124-132.
17. Whitney, T.D., M.M. Cram, B.F. Barnes, J. Yao, R.D. Lucardi, and K.J.K. Gandhi. 2018. **Tree-level distribution of a novel insect-pathogen complex and its potential contribution to eastern white pine dieback.** Forest Ecology & Management 423: 49-58. <https://doi.org/10.1016/j.foreco.2018.02.002>

### Submitted Publications (in review):

1. Seabright, K., S.W. Myers, S.W. Fraedrich, A.E. Mayfield III, and A. Taylor (in review). **Methyl bromide fumigation as a phytosanitary treatment for black walnut logs infested with the thousand cankers disease vector and pathogen.** Forest Science.

### Presentations and Lectures:

1. Bedoya, C., E. Brockerhoff, M. Hayes, R. Hofstetter, D. Miller, and X. Nelson. 2018. **A novel set of acoustic features for the categorization of stridulatory sounds in beetles.** 10th International Conference on Ecological Informatics, Jena, Germany.
2. Best, G.S., and S.W. Fraedrich. **An assessment of the potential impact of laurel wilt on clonal populations of pondberry (*Lindera melissifolia*).** 21st Ornamental Workshop on Diseases and Insects, Kanuga Conference Center, 9 Oct 2018, Hendersonville, NC.
3. Foley, J.R., B. Strahm, A. Mayfield, and S. Salom. 2018. **Assessment of soil site characteristics on success of establishment of the biological control agents *Laricobius* spp. (Coleoptera: Derodontidae) in the eastern U.S.** 59th Southern Forest Insect Work Conference, 18 July 2018, San Antonio, TX.
4. Hamilton, J.L., C. Villari, S.W. Fraedrich. 2018. **Detecting the laurel wilt pathogen using LAMP.** Southern Forest Insect Work Conference. 17-20 July, 2018. San Antonio, TX. (Abstract).
5. Hamilton, J.L., S.W. Fraedrich, C. Villari. 2018. **A rapid, molecular method for detecting the laurel wilt pathogen directly in-field.** University of Georgia Plant Center Fall Retreat, Unicoi, GA, 27-29 Sept., 2018.

6. Ibarra Caballero, J.R., J. Jeon, Y. Lee, S.W. Fraedrich, N.B. Klopfenstein, M. Kim, J.E. Stewart. 2018. **Genome assembly and annotation of *Raffaelea lauricola*: a comparison with other members of the Ophiostomatales.** International Mycological Congress. 16-21 July, 2018. San Juan, Puerto Rico. (Abstract)
7. Jackson, P.D., N. Bolner, J.P. Barnett, and R. Olatinwo. 2018. **Evaluation of sowing methods to detect *Sonderegger* pine seedlings.** Joint Annual Meeting of the Northeastern Forest & Conservation Nursery Association and the Southern Forest & Conservation Nursery Association, July 16 - 19, 2018, Pensacola, FL.
8. Jetton, R.M., and A.E. Mayfield. 2018. **Silviculture options for improving hemlock health in the Southern Appalachians.** 59th Southern Forest Insect Work Conference, 20 July 2018, San Antonio, TX.
9. Jubb, C., A. Mayfield, G. Wiggins, J. Grant, J. Elkinton, T. McAvoy, J. Lombardo, B. Mudder, and S. Salom. 2018. **Impact assessment of predatory beetle, *Laricobius nigrinus*, on hemlock woolly adelgid in the eastern U.S.** 59th Southern Forest Insect Work Conference, 18 July 2018, San Antonio, TX.
10. Lucardi, R.D. 2018. **Always the beautiful answer who asks a more beautiful question: The power of basic and applied sciences in invasion and conservation biology.** Invited Seminar at the Joseph W. Jones Ecological Center. 20 September 2018, Ichauway, GA.
11. Mayfield, A.E. 2018. **Learning from the forest.** Presentation to 6th grade students at A.C. Reynolds Middle School, 30 May 2018, Asheville, NC.
12. Mayfield, A.E. 2018. **Silviculture: Can it help the hemlocks?** Presentation to general public, Foothills Science Series, Chattahoochee-Oconee National Forest, 9 Aug 2018, Dahlonega, GA.
13. Mayfield, A.E., and R.M. Jetton. 2018. **Exploring eastern hemlock silviculture and restoration in response to HWA.** Presentation to participants on the USDA Forest Service Eastern Region (R9) Forest Health Conference Call, 5 June 2018, Asheville, NC.
14. Mayfield, A.E., R.M. Jetton, and B.T. Mudder. 2018. **Field tour of eastern hemlock silviculture and target-tree release research plots,** to participants of the Hemlock Woolly Adelgid Program Managers Meeting, 31 Jul 2018, at Savage River State Forest, Grantsville, MD.
15. Mayfield, A. 2018. **Monitoring spread and impact of laurel wilt in sassafras beyond the Gulf-Atlantic Coastal Plain.** 59th Southern Forest Insect Work Conference, 17 July 2018, San Antonio, TX.
16. Neidermeier, A., K. Motley, N. Havill, D. Ross, A. Mayfield, M. Whitmore, and K. Wallin. 2018. **Biological control and the hemlock woolly adelgid (*Adelges tsugae* Annand): new hope for management using PNW silver flies (*Leucopis* spp.).** Ecological Society of America Annual Meeting, 5-10 Aug 2018, New Orleans, LA (poster).
17. Niyas, A. M.M., M.M. Cram, S.W. Fraedrich and C. Villari. **Using a metabarcoding approach to investigate the causal agent of the sugarberry decline and mortality (SBDM) in southeastern US.** University of Georgia Plant Center Fall Retreat, Unicoi, GA, 27-29 Sept., 2018.
18. Olatinwo, R., J. Hwang, and W. Johnson. 2018. **Laurel wilt on swamp bay – first detection in Louisiana.** 59th Southern Forest Insect Work Conference July 17 – 20, 2018, San Antonio, TX.

19. Olatinwo, R., J. McKenney, and W. Johnson. 2018. **Identification and characterization of *Fusarium euwallaceae* and *Paracremonium* species associated with *Euwallacea interjectus* in Louisiana.** 59th Annual Southern Forest Insect Work Conference July 17 – 20, 2018, San Antonio, TX.
20. Shepherd, W. P., B. T. Sullivan, J. Nowak, S. Clarke, P. Merten, J. Meeker, B. Parpart, B. Bruce, A. Rachal, R. Billings, W. Upton, and J. Riggins. 2018. 17. **Evaluation of southern pine beetle behavioral and antennal responses to components of three host odor lures.** 59th Southern Forest Insect Work Conference, 17-20 July 2018, San Antonio, TX (Poster).
21. Ulyshen, M.D. 2018. **The diversity, ecology and conservation of saproxylic insects.** Southern Forest Insect Work Conference, 17-20 July 2018, San Antonio, TX.
22. Ulyshen, M.D. 2018. **Insect effects on wood decomposition and forest productivity in the southeastern U.S.** Southern Forest Insect Work Conference, 17-20 July 2018, San Antonio, TX.
23. Ulyshen, M.D. 2018. **The diversity, ecology and ecological importance of saproxylic insects.** Brownbag Seminar, Coweeta Hydrologic Laboratory, 30 August 2018, Otto, NC.
24. Wallin, K.F., A. Neidermeier, K. Motley, D.W. Ross, N.P. Havill, K. Hoover, M.C. Whitmore, and A.E. Mayfield. 2018. **Update: Evaluating the use of silver flies from the western US on *Adelges tsugae* in the eastern US.** Hemlock Woolly Adelgid Program Managers Meeting, 31 Jul 2018, McHenry, MD.
25. Whittier, A., R. Jetton, and A. Mayfield. 2018. **Camcore Domestic Program Update.** 38th Camcore Annual Meeting. 25 Sep – 5 Oct 2018, Cali, Colombia.
26. Whitney, T.D., R.D. Lucardi, and K.J.K. Gandhi. 2018. **Population-genetic structure of the eastern white pine bast scale (*Matsucoccus macrocitrices*).** 59th Annual Southern Forest Insect Work Conference, July 2018, San Antonio, TX.

## USDA Forest Service

### Forest Health Protection, Southern Region

<http://www.fs.usda.gov/main/r8/forest-grasslandhealth>

### Southern Research Station

#### RWU 4552: Insects, Diseases and Invasive Plants of Southern Forests

<http://www.srs.fs.usda.gov/idip/index.html>

